CHAPTER 7.000

ENVIRONMENTAL DESIGN STANDARDS

7.100 STREET AND SITE LIGHTING STANDARDS

The standards established within this section are applicable to lighting required in conjunction with subdivision and/or site plan development. In addition, the light and glare performance standards established within the Zoning Ordinance shall be met, where applicable.

It is the intent of this section to assure lighting practices and systems that will improve the quality and effectiveness of night-time lighting, protect the night sky, provide glare reduction, minimize light trespass, and conserve energy and resources, while maintaining night-time safety, utility, security and productivity.

7.110 GENERAL REQUIREMENTS

Construction plans and profiles and site plan submissions shall show the layout of the proposed lighting fixtures. The plans shall also include a narrative specifically outlining the proposed lighting standards and specifications, the parties responsible for the associated operation and maintenance costs and, if applicable, the permit requirements, as established in this section. Fixtures shall be located so as not to interfere with other utilities, and to minimize potential conflicts with building sites. Lighting shall be provided in accordance with the following:

A. Unless prohibited by VDOT standards, full cutoff and fully shielded light fixtures shall be utilized to meet the requirements of this chapter.

1. Street lighting shall be provided at Public and Category A subdivision street intersections within single family detached subdivisions in accordance with the standards outlined in this chapter. This applies to street intersections in all Urban Districts and all Planned Districts as defined in the Zoning Ordinance with the exception of PD-RV and PD-CV Districts.

2. Street lighting shall be provided along private streets/accessways within townhouse developments in accordance with the standards outlined in this chapter.

3. Site lighting shall be provided within multi-family developments in accordance with the standards outlined in this chapter.

B. Residential Subdivisions/Site Plans

1. Street lighting shall be provided at Public and Category A subdivision street intersections within single family detached subdivisions in accordance with the standards outlined in this chapter. This applies to street intersections in all Urban Districts and all Planned Districts as defined in the Zoning Ordinance with the exception of PD-RV and PD-CV Districts.

2. Street lighting shall be provided along private streets/accessways within townhouse developments in accordance with the standards outlined in this chapter.

3. Site lighting shall be provided within multi-family developments in accordance with the standards outlined in this chapter.

C. Retail, Commercial, Office, And Industrial Subdivisions/Site Plans

1. Street lighting shall be provided at Public and Category A subdivision street intersections in accordance with the standards outlined in this chapter.

2. Site lighting shall be provided within developments which provide customer services to the general public after 5:00 p.m.

7.120 LIGHTING STANDARDS

A. Street Lighting

1. Lighting located at subdivision street intersections shall be at a minimum of a 5,000 lumen colonial fixture with a Type III reflector or approved equal mounted at a 14' height. Four way intersections will require a maximum of 2 lights located on opposite corners. Intersections with four lane divided roadways will require lights at all corners.

B. Site Lighting

1. Lighting located within single family attached or multi-family developments shall be in general accordance with the Table below. Deviations from this table may be allowed if adequate information is provided to ensure that the_requirements are met in an equivalent manner.

Table I - Standard Street Lighting Spacing

Lamp: **Colonial Fixture** **Reflector:** **Type III**		
Lumen Rating	**Mounting Height**	**Maximum Spacing**
5,000	10'	100'
5,000	14'	120'
8,000	10'	150'
8,000	14'	190'

2. Lighting located within developments which provide customer service to the public after 5:00 p.m. shall have a minimum of .6 foot-candle at grade and the average horizontal illumination shall not exceed 40 foot-candles at grade level, subject to a uniformity ratio (ratio of average to minimum illuminance) no greater than 4:1.

7.130 OPERATIONAL, MAINTENANCE, AND INSTALLATION COSTS

A. Operation and maintenance costs of the lighting system will not be the responsibility of Loudoun County.

B. The recordation documents of the subdivision will indicate that the operational and maintenance costs are not the public responsibility, and will further designate the party with whom these responsibilities will ultimately lie.

C. Where the proposed system lies within or adjacent to dedicated public street right-of-way, the Virginia Department of Transportation requires that such operation, maintenance, and installation can only be contracted through public utilities or Loudoun County. The developer or responsible party shall sign an agreement with the public utility which guarantees full payment to the public utility of all associated charges, as well as all administrative costs experienced by the public utility. Said agreement shall be executed prior to Performance Bond release.

D. When VDOT requests the installation of street lights within publicly maintained street right-of-way concurrent with the land development application process of Loudoun County, VDOT shall be obligated for the future operation and maintenance costs arising after the acceptance into the State system.

7.300 TREE CONSERVATION

The area of land to be cleared of trees and other vegetation in conjunction with development or land use shall be limited to the building footprint and area necessary to construct the proposed use or development. Refer to the Virginia Erosion and Sediment Control Handbook for appropriate tree preservation measures during land disturbing activities.

7.301 TREE PRESERVATION

The County encourages the preservation of native species to provide and maintain a hardy, drought resistant, low maintenance landscape that reduces the costs of stormwater infrastructure, reduces downstream flooding, reduces water pollution, prevents soils erosion, supports an established wildlife habitat, enhances air and water quality, increases groundwater and aids in conserving energy used for heating and cooling. Preservation of native plants eliminates or significantly reduces the need for fertilizers, pesticides and water. Tree and plant preservation, especially within floodplains and stream riparian buffers, can provide BMP credits, as established in Chapter 5 of this manual.

A. Individual tree preservation areas should be identified prior to the development of site plan or construction plans and profiles.

B. Trees should not be destroyed or damaged in any manner until the final design has been approved.

C. When determining areas for tree preservation, consideration should be given to the tolerance of trees and other vegetation to new exposure such as increased direct sunlight, increased radiant heat from buildings and pavement, and increased exposure to wind.

D. Consideration should be given to development impacts on the surface drainage. An increase or reduction in available water caused by changes in grades may adversely impact trees and other vegetation proposed to be preserved.

E. Tree preservation areas should include all trees, existing understory vegetation and deadfall.

F. Trees that need to be removed for development should be assessed to determine if they are suitable for transplanting to other locations on the site.

G. The following trees, shrubs, plants, and specific areas are considered priorities for

retention and protection and, if retained, should be left in an undisturbed condition:

1. Trees, shrubs, and plants located within the Floodplain Overlay District;

2. Intermittent and perennial stream buffers, nontidal wetlands, and steep slope areas;

3. Contiguous forest that connects the largest undeveloped or most vegetated tracts of land within and adjacent to the site;

4. Trees, shrubs, or plants determined to be rare, threatened, or endangered under the federal Endangered Species Act of 1973 in 16 U.S.C. §§1531--1544 and in 50 CFR Part 17, and those species identified by the Virginia Department of Game and Inland Fisheries;

5. Trees that are identified as part of a registered historic site;

6. Hedgerows/Fencerows; and

7. Invigorated, healthy, structurally sound trees having a diameter measured at 4.5 feet above the ground of 30 inches or more, as determined by a Professional Arborist/Urban Forester.

7.302 TREE CONSERVATION PLAN

A tree conservation plan, prepared by an Urban Forester, Certified Arborist or Landscape Architect, is required for site plans and construction plans and profiles where it is proposed to preserve an existing stand of trees or woodland area to meet canopy or buffer yard requirements as set forth in the Zoning Ordinance or to provide BMP measures as part of an overall stormwater management program or design. This plan may be provided in either an illustrative or narrative form, accompanied by photographs if desired by the applicant, to describe the overall size and species within the preserved area and to demonstrate that the preservation area meets the requirements or portion of such requirements for the intended use such as tree canopy, buffer yards or BMP's. When preservation measures are employed to meet canopy, buffer yard or BMP requirements, the grading plans prepared in association with the site plan/construction plans and profiles and accompanying grading permit application shall include a tree protection plan with a clear delineation of the critical root zone (CRZ) as set forth in this manual.

7.303 TREE PROTECTION DURING CONSTRUCTION

A. Critical Root Zone

Tree preservation areas shall be identified on the site plan or construction plans and profiles. A "critical root zone" (CRZ) shall be delineated on the plans and clearly marked and protected in the field prior to any land disturbance. The CRZ shall be determined as follows:

1. For individual trees, the CRZ shall be represented by a concentric circle centered on the tree trunk with a radius equal in feet to one (1) times the number of inches of the trunk diameter (i.e., The CRZ for a twenty (20) inch diameter tree is twenty (20) feet).

2. When two or more trees are grouped together within a designated tree preservation area, the limit of the CRZ shall be the aggregate of the individual CRZs or a line 15 feet beyond the aggregate dripline of the trees.

B. General Requirements

1. Prior to any land disturbance suitable protective barriers, such as safety fencing, shall be erected outside of the CRZ of any tree or stand of trees to be preserved. Protective barriers shall remain so erected throughout all phases of construction. No grade changes or storage of equipment, materials, debris, or fill shall be allowed within the area protected by the barrier. No construction traffic, parking of vehicles, or disposal of liquids is permitted within the CRZ.

2. Tree roots which must be severed shall be cut by a trencher or similar equipment aligned radially to the tree. This method reduces the lateral movement of the roots during excavation, which if done by other methods could damage the intertwined roots of adjacent trees. This effort shall take place and be complete prior to any land disturbance activities.

3. Within four hours of any severance of roots, all tree roots that have been exposed and/or damaged shall be trimmed cleanly and covered temporarily with moist peat moss, moist burlap, or other moist biodegradable material to keep them from drying out until permanent cover can be installed.

4. Trees likely to die as a result of site disturbance activities within 25 feet of the safety fence, as identified in the tree conservation plan, shall be removed.

5. Grade changes and excavations shall not encroach upon the tree CRZ, unless supported by plan prepared by a design professional in this field and approved by the County.

6. No toxic materials, including petroleum products, should be stored within 100 feet of the CRZ.

7. Sediment, retention, and detention basins shall not be located within the CRZ. The basins shall not discharge directly into the CRZ unless the discharge is transitioned back to sheet flow prior to entering the CRZ or is discharged into an adequate natural channel, in accordance with Chapter 5 of this manual.

C. When there is a change of grade within the tree conservation boundary of 30 inches or less, the cut slope will be graded no greater than 2:1. Where the change of grade is over 30 inches, a retaining wall shall be required.

D. Pruning Methods

All final cuts shall be made sufficiently close to the trunk or parent limb but without cutting into the branch collar or leaving a protruding stub, according to the American National Standards Institute. All necessary pruning cuts must be made to prevent bark from being torn from the tree and to facilitate rapid healing. Flush cuts are unacceptable.

~~7.304 ESTABLISHMENT OF RIPARIAN STREAM BUFFERS~~

~~The County promotes the use of riparian stream buffers for the purpose of providing the required water quality BMP for a development site and such buffers may be used for BMP credits, in accordance with Chapter 5 of this manual. The performance standards set forth in this section shall be used for the purpose of establishing a new buffer or to enhance an existing buffer. In either, case the minimum width of the buffer shall be 100 feet, measured from the stream's edge.~~

7.304 RESOURCE PROTECTION AREA (RPA) PLANTING PLAN REQUIREMENTS

The following provisions outline the planting plan requirements within RPAs pursuant to the Chesapeake Bay Preservation Ordinance (Chapter 1222). All planting plans shall be prepared under the direction of and signed by a certified arborist or professional forester who has at least a Bachelor of Science degree from an accredited School of Forestry. Planting plans shall specifically address plant materials, planting density, site preparation, site stabilization, release/maintenance, potential for wildlife damage, and stocking requirements. Any proposed streambank stabilization and noxious weed control also should be included in the planting plan.

A. Plant Materials

~~Tree and shrub species should be native and have multiple values such as biomass, nuts, fruit, browse, nesting, and aesthetics. Native riparian tree species are preferable because they co-evolved with the stream's inhabitants. Bottomland species, such as silver maple,~~

~~black willow, eastern cottonwood, green ash, and sycamore, are best suited for this zone. In the drier portions of the streamside zone, hardwoods such as black walnut, red and white oak, and white ash can be planted. If the water table is at least 3 feet below ground for most of the growing season, plant hardwood species that require good drainage. If the site has poor drainage, select hardwood species that are more tolerant of wet conditions. Some examples are river birch, black ash, bitternut, hickory, and hackberry. Species diversity should be provided in order to avoid loss of function due to species-specific pests; plantings should consist of a mixture of two or more species to achieve diversity. Tables within this chapter contain recommended riparian stream buffer tree species and plants.~~ Trees and other selected plants shall be native and have multiple use benefits that improve or enhance wildlife habitat, recreation, and overall aesthetic values. Plantings shall consist of a mixture of five or more native species to achieve diversity. Table 6 outlines Recommended Buffer Area Plants. The County Urban Forester may approve the use of additional plant species where appropriate.

~~1. One to two year old seedlings of most tree and shrub species, or rooted or unrooted cuttings of black willow can be obtained from various forest nurseries. Seeds should be ordered as PLS (Pure Live Seed).~~

~~2. Plant trees and shrubs~~

1. Plantings shall be installed as soon as possible after receiving them. If installation ~~planting~~ must be delayed, ~~keep~~ plants shall be kept cool and moist ~~or heel in.~~, or be heeled-in if they cannot be planted within 48 hours of delivery from the nursery. Always use high quality stock with good root systems. Quality hardwood seedlings should have a minimum of four to five large lateral roots.

~~3. Trees and shrubs~~2. Plantings should be ~~planted~~installed in early spring (March–April). A tree ~~planter~~planting machine, auger, planting bar, or shovel can be used to plant seedlings ~~and cuttings. Before planting, soak rooted cuttings in water for 2 to 4 hours and unrooted cuttings for 24 hours~~. Root collars of seedlings should be slightly below the soil surface. ~~Make sure planting~~ Planting holes ~~are~~ should be closed, ~~that~~ plant material ~~is~~should not be J-rooted, and the soil around the root or cutting ~~is~~should be firm. ~~For unrooted cuttings, plant deep enough to leave only 1 or 2 buds above ground.~~

~~4. Site preparation, tree protection and maintenance are required in a riparian stream buffer. Technical expertise is available from the Virginia Department of Forestry or through the Urban Forester, Department of Building and Development.~~

~~5. Grass and forb seeds may be broadcast planted using a spinner-type seeder or a drop-seeder.~~

B. Planting ~~Densities for Shrubs and Trees~~Density Requirements

~~Initial plant-to-plant densities for trees and shrubs will depend on their potential height at 20 years of age. Estimated heights are included in Table 6. It is recommended that plant spacing be clustered in a natural pattern.~~

Planting shall be accomplished on a staggered and generally uniform spacing in accordance with the plant densities, and inclusive of all plant size categories, outlined in Table 2. Understory trees should be interplanted among canopy species. For the purpose of this requirement, a canopy tree shall be defined as any tree 30 feet tall or greater at maturity, while an understory tree shall be defined as any tree less than 30 feet tall at maturity.

Table 2 - ~~Recommended Planting~~Required Plant Densities for Buffer Areas

Plant ~~Types/Height~~Size Categories	Plants per Acre	Plant Spacing (ft)
~~Shrubs less than 10 ft in height~~ Seedlings~~/~~Tublings~~ (Canopy Trees)	~~4,500 to 1,750~~250	~~3 to 5~~13 ft. O.C.
Seedling/Tubling (Shrubs)	165	16 ft. O.C.
~~Shrubs and trees from 10 to 25 ft in height~~3-gallon (Understory Trees)	~~1,750 to 450~~110	~~5 to 10~~13 ft. O.C. ~~10to 30~~
3-gallon (Canopy Trees) ~~greater than 25 ft in height~~	~~450 to 100~~150	

~~Source: USDA-NRCS~~

~~C. A minimum of 2 rows of trees and shrubs should be established alongside the water resource (i.e. Streamside Zone). The remaining area of the designated riparian zone should also be planted or left to meet natural regeneration requirements. Plantings can be intermixed with open areas treated for natural regeneration. An opening should not exceed 4,356 square feet (1/10 acre) in area. Total open area should not exceed 25% of the riparian stream buffer.~~

~~D. Natural regeneration and direct seeding may be used with approval of the Director, where rapid establishment is not a high priority, and invasive plant species are absent. Where a native seed source exists within close proximity, allowing natural regeneration to occur may be the most cost-effective approach. Seeds may be sown to improve the success rate of desired species. A naturally regenerated riparian stream buffer is considered initially established when plant densities have reached the planted buffer recommended densities for trees and shrubs. Three growing seasons is a reasonable amount of time in which to determine if natural regeneration would take place and be initially established. Trees and~~

~~shrubs are considered established when they have begun to dominate herbaceous plants and undesired shrubs that are competing with them for nutrients, water, and sunlight.~~

~~E. Trees in the riparian stream buffer help provide streambed and streambank stability. Deadwood and leaf litter falling into the stream helps regenerate the streambed, and is very important to the health of the stream and to aquatic life. The tree species nearest the water's edge also provide shade and are selected for their ability to quickly develop deep roots that can increase bank stability.~~

Where planting is required in conjunction with a restoration plan prepared subsequent to a violation of the requirements of Chapter 1222, the required minimum vegetation replacement rates outlined in Table 3 shall apply.

Table 3 - Required Minimum Vegetation Replacement Rates for Restoration Plans

Vegetation Removed	Replacement Vegetation
1 tree or sapling ½" to 2½" caliper	1 tree at equal caliper or greater
1 tree ≥ 2½" caliper	1 tree at 1" - 2" caliper, or 1 evergreen tree at 6' minimum height, per every 4" caliper of tree removed (e.g., a 12" caliper tree would require 3 trees to replace it), with a minimum of 75 percent deciduous trees
1 large shrub	1 large shrub at 3-4' minimum height

~~Recommended Tree Species for Streamside Zone~~		
~~American beech~~ ~~Trees~~	~~Green Ash~~	~~Silver maple~~
~~Bald cypress~~	~~Hackberry~~	~~Sweetgum~~
~~Basswood~~	~~Loblolly pine~~	~~Swamp white oak~~
~~Bitternut hickory~~	~~Persimmon~~	~~Sycamore~~
~~Blackgum~~	~~Pitch pine~~	~~Tulip poplar~~
~~Black walnut~~	~~Red maple~~	~~White ash~~

~~**Table 4**~~

~~Recommended Shrub Species for Streamside Zone~~

Arrowwood	Inkberry	Spicebush
Bayberry	Maple-leaf viburnurm	Swamp azalea
Buttonbush	Pinxterbloom azalea	Swamp leucothoe
Common ninebark	Pussy willow	Sweet pepperbush
Elderberry	Red chokeberry	Virginia sweetspire
Grey dogwood	Rosebay rhododendron	Winterberry

Table 5

Recommended Understory Woody Plants for Streamside Zone		
American holly	Flowering dogwood	Redbud
Blackhaw	Hornbeam	Shad bush
Boxelder	Paw paw	Sweet bay

Notes:

1. The large hardwood tree species mentioned above provide a canopy as they mature. Understory trees and shrubs should be interplanted among these canopy species to provide stability for the streambank and shading next to the water.

2. Table 4 lists shrub species tolerant of flooding and wet soils.

3. Table 5 lists understory species recommended for the Chesapeake Bay watershed.

4. On sunny banks, shade-intolerant species will thrive until overshadowed by the canopy. On wide streams, south-and west-facing banks receive more sun. North facing streambanks receive less solar exposure. Fewer species thrive in these shadier conditions, so plant selection is more limited. Swamp leucothoe (fetterbush), pinxterbloom azalea, spicebush, rosebay rhododendron, and mapleleaf viburnum are good choices for shady conditions.

5. Native forbs also may be part of the mix, especially if they are seeded in clumps with other native grasses.

F.

C. Site Preparation of Planting sites

Planting plans shall include a section addressing site preparation. Sites shall be properly prepared based on the soil type and existing and planned vegetation.

~~1. Often, a riparian stream buffer will have a mixture of pasture, overgrown fields, and a line of branchy, poor quality trees along the stream. This requires~~ , that may require a combination of site preparation techniques. ~~In all situations a combination of mechanical and herbicidal methods will be most effective and efficient. Site preparation should begin the fall prior to planting. In some situations~~ If herbicides are to be used for site preparation ~~can require up to a year of vegetation control prior to planting. Any necessary streambank stabilization needs to be included~~, the specific herbicides shall be identified in the planting plan ~~so work can proceed in a logical order~~and shall be used only when and where needed to control competition from undesirable plants. Only herbicides that are rendered inactive upon contact with the soil shall be used in the Buffer Area. Herbicides shall be handled and disposed of properly in accordance with federal, state and local regulations.

~~2~~1. If the area has been used for row crops, ~~disk~~ the ground shall be disked in the spring and ~~seed the area where the woody material will be planted with~~ seeded with a cover crop, such as annual rye grass or cereal rye. ~~Since a good cover is essential, cool season grasses such as field bromegrass and tall fescue are often appropriate.~~ These grasses are not invasive, do not require mowing, and will be shaded out (eventually eliminated) by the woody plants.

~~3~~2. In pasture-type situations, ~~eliminate~~ competing perennial vegetation shall be eliminated mechanically and/or with herbicides in 3-to 4-foot-wide circles or strips where trees ~~or shrubs~~ will be planted. Broader application of herbicides may be utilized when establishing mitigation projects, on a case by case basis. ~~Many pasture type areas may be machine planted. The machinery removes strips of grass and competing vegetation along the lines being planted. It also allows for much easier follow-up maintenance. Problem~~Invasive species~~, such as multiflora rose and honeysuckle, will still need to~~shall be controlled by cutting, pulling, and/or herbicides.

~~4. Abandoned fields of varying ages already have tree saplings, shrubs,~~3. Existing desirable vegetation a minimum of four feet in height may be used to achieve the required 3-gallon plant densities outlined in Table 2 and Table 3. Any existing desirable vegetation under four feet in height may be used to achieve the required seedling/tubling densitites outlined in Table 2 and ~~vines.~~Table 3. In this situation, site preparation ~~focuses~~will focus on ~~releasing the desired saplings and other plants from~~ eliminating competition ~~by~~ from undesired species. ~~Release methods vary according to the target species and extent of infestation by invasives.~~ Techniques for eliminating competition may include,

without limitation, spraying basal bark herbicides during the dormant season, cutting ~~large~~trees, shrubs and vines and then treating the stumps to prevent resprouting, and mowing everything around the ~~"keepers"~~desirable vegetation after ~~they have~~it has leafed out~~. in late spring. Larger cut stumps~~

D. Site Stabilization

In addition to the required plantings, the Buffer Area shall be stabilized using the Herbaceous Seed Mixture for Riparian Buffers outlined in Table 7.

E. Release/Maintenance~~:~~

Techniques to reduce competing vegetation around newly installed plant material, including but not limited to mats and mulch, shall be used.Herbicides, mowing and mechanical applications previously described may also be used as a form of release or for periodic maintenance to assure sustained viability of targeted planting densities. Weed control may also ~~require an application of an herbicide to control resprouting.~~include, without limitation, 2 to 4 inches of organic mulch, shallow cultivation, non-chemical weed control techniques, and shall be continued until woody plants are established, normally 2 – 3 years after planting.

~~5. Herbicides that are rendered inactive upon contact with the soil are recommended for riparian stream buffers. If pesticides are used for site preparation, apply only when needed and where needed to control competition from undesirable plants or insect damage. Handle and dispose of pesticides properly and in accordance with federal, state and local regulations. Follow label directions and heed all safety precautions listed on the container.~~

~~G. Site Stabilization~~

~~Mulch may be used for erosion control, weed control, and moisture conservation for new plantings on all sites, particularly those with pronounced growing season moisture deficits or invasive, weedy species. When stabilizing the disturbed areas between tree plantings, do not use grasses or legumes which will "out compete" the new seedlings. Where possible, a circle of heavy mulch around seedlings will help them compete with herbaceous plants.~~

~~H. Planting Protection~~

~~Human activities, livestock activities, and wildlife might hinder successful establishment of a riparian buffer. Planting protection should be considered where there is potential for damages. Cattle, horses or stock must be fenced from any riparian planting. This also protects water quality and prevents streambank degradation.~~

~~I~~F. Wildlife Damage

~~Browsing deer or beaver activity might hinder establishment of a riparian stream buffer. To~~ Measures to prevent or reduce damage to the ~~riparian stream buffer~~ Buffer Area from deer browse or beaver ~~consider using one or more of~~activity, may include, without limitation, the following ~~measures~~:

1. Plant selection. Use plants that are considered less palatable to beaver or deer. ~~Using plants that may not be attractive to these animals might help reduce browsing damage. However, starving beaver and deer will feed on anything they can reach.~~

~~2. Some plants considered less palatable to beaver are: Spruce, White Cedar, Hemlock, Tamarack (Larch), Beech, Red Maple, and White Birch. Avoid plants that are preferred by beaver such as Poplars (tulip tree), Yellow Birch, and Ash.~~

~~3. Some plants considered less palatable to deer are: Alder, Spruce, Hemlock, Tamarack (Larch), Beech, Hornbeam (Iron wood), Hawthorne, and Sycamore. Avoid using plants preferred by deer such as Ash, Apple, White and Yellow birch, Maples, White Cedar, Dogwoods, and Willows.~~

~~4. Some plants that are preferred deer or beaver foods, but will endure heavy browsing are: Dogwoods, Willows, Ash, and Yellow Birch.~~

~~5~~

2. Protect young seedlings~~. Planting tubes are commercially available to protect young seedlings from browsing. Tubes are not recommended where~~ with planting tubes. However, tubes shall not be used in areas subject to frequent flooding ~~occurs~~.

~~6~~3. Deer Repellents~~: Taste~~. Apply taste and odor repellents ~~are commercially available. Repellent performance will vary depending on the density of~~to deter deer browse.

G. Stocking Requirements

A targeted stocking of 75 percent survival with uniform distribution shall be achieved within one year of planting as determined by the Administrator. In the event that the targeted stocking is not achieved, the ~~deer population and~~Applicant shall provide supplemental planting to achieve the ~~availability of other sources of food.~~ targeted stocking prior to bond release.

~~J. Maintenance~~

~~Weed control is essential for the survival and rapid growth of trees and shrubs in a buffer. Options include 4 to 6 inches of organic mulch, weed control fabrics, shallow cultivation, nonchemical weed control techniques, and mowing. Continue weed control until woody plants occupy the area, normally 2 to 3 years.~~

~~K. Long-term Management~~

~~Buffers should be monitored and managed to maintain their maximum water quality and wildlife habitat benefits. They should be inspected at least once a year, and always within a few days of severe storms for evidence of sediment deposit, erosion, or concentrated flow channels. Repairs should be made as soon as possible.~~

Table 6 - Recommended ~~Trees for Riparian~~ Buffer ~~Areas~~Area Plants
~~(Match Species with drainage)~~

Common Name	Scientific Name
Canopy Trees	
Red Maple	*Acer rubrum*
Silver Maple	*Acer saccharinum*
River Birch	*Betula nigra*
American Sycamore	*Platanus occidentalis*
Cottonwood	*Populus deltoides*
Swamp White Oak	*Quercus bicolor*
Pin Oak	*Quercus palustris*
Black Willow	*Salix nigra*
Basswood	*Tilia americana*
Black Birch	*Betula lenta*
Black Walnut	*Juglans nigra*
Sweetgum	*Liquidambar styraciflua*
Yellow/Tulip Poplar	*Liriodendron tulipifera*
Black Gum	*Nyssa sylvatica*
Swamp Chestnut Oak	*Quercus michauxii*
Water Oak	*Quercus nigra*
Willow Oak	*Quercus phellos*
Bald Cypress	*Taxodium distichum*
Hackberry	*Celtis occidentalis*
Overcup Oak	*Quercus lyrata*
Evergreen Canopy Trees	
Eastern Redcedar	*Juniperus virginiana*
Tamarack	*Larix laricina*
White Spruce	*Picea glauca*
White Pine	*Pinus strobus*
Northern White Cedar	*Thuja occidentalis*
Loblolly Pine	*Pinus taeda*
Understory Trees	
American Holly	*Ilex opaca*
Blackhaw Viburnum	*Viburnum prunifolium*
Boxelder	*Acer negundo*
Flowering Dogwood	*Cornus florida*
American Hornbeam	*Carpinus caroliniana*
Common Pawpaw	*Asimina triloba*
Eastern Redbud	*Cercis canadensis*
Shadbush	*Amelanchier arborea*

Sweetbay Magnolia	*Magnolia virginiana*
Speckled Alder	*Alnus rugosa*
Gray Birch	*Betula populifolia*
Smooth Serviceberry	*Amelanchier laevis*
Red Mulberry	*Morus rubra*
October Haw	*Crateagus flava*
Eastern Hophornbeam	*Ostrya virginiana*
Shrubs	
~~Silky Dogwood~~	~~*Cornus amomum*~~
~~Hawthorn~~	~~*Crataegus spp.*~~
~~Winterberry~~	~~*Ilex verticillata*~~
~~Bankers Dwarf Willow~~	~~*Salix cotteti*~~
~~Pussy Willow~~	~~*Salix bicolor*~~
~~Streamco Purpleosier~~	~~*Salix purpurea*~~
~~Elderberry~~	~~*Sambucus Canadensis*~~
~~Highbush Blueberry~~	~~*Vaccinium corymbosum*~~
~~Nannyberry~~	~~*Viburnum lentago*~~
~~Buttonbush~~	~~*Cephalanthus occidentalis*~~
~~Gray Dogwood~~	~~*Cornus racemosa*~~
~~Arrowwood Viburnum~~	~~*Viburnum dentatum*~~
~~Swamp Bayberry~~	~~*Myrica heterophylla*~~
~~Inkberry~~	~~*Ilex glabra*~~
~~Common Ninebark~~	~~*Physocarpus opulifolius*~~
~~Maple-leaf Viburnum~~	~~*Viburnum acerifolium*~~
~~Spicebush~~	~~*Lindera benzoin*~~
~~Swamp Azalea~~	~~*Rhododendron viscosum*~~
~~Sweet Pepperbush~~	~~*Clethra alnifolia*~~
~~Virginia Sweetspire~~	~~*Itea virginica*~~
~~Red Chokeberry~~	~~*Aronia arbutifolia*~~
Grey Dogwood	*Cornus racemosa*
American Hazelnut	*Corylus americana*
Hawthorn	*Crataegus spp. – C. coccinea*
Hawthorn	*Crataegus spp. – C. crus-galli*
Hawthorn	*Crataegus spp. – C. flabellata*
Virginia Sweetspire	*Itea virginica*
Northern Spicebush	*Lindera benzoin*
Black Chokeberry	*Photinia melanocarpa*
Red Chokeberry	*Photinia pyrifolia*
Common Ninebark	*Physocarpus opulifolius*
Common Elderberry	*Sambucus canadensis*
Coral Berry	*Symphoricarpos orbiculatus*

High-Bush Blueberry	*Vaccinium corymbosum*
Blue Ridge Blueberry	*Vaccinium pallidum*
Deerberry	*Vaccineum stamineum*
Maple-Leaf Viburnum	*Viburnum acerifolium*
Southern Arrowwood	*Viburnum dentatum*
Black-Haw Viburnum	*Viburnum prunifolium*

Common Name	Scientific Name	Mature Ht. (ft)	Tolerance to Wet Soils	Tolerance to Shade	Tolerance to Dry Soils	Tolerance to Flooding	Aesthetics	Wildlife Habitat
			L=Low, M=Medium, H=High					
Hardwood Trees								
Red Maple	*Acer rubrum*	50 to 70	H	M	H	H	H	M
Silver Maple	*Acer saccharinum*	60 to 80	H	L	L	M	M	M
Speckled Alder	*Ainus rugosa*	30 to 40	H	H	M	H	M	M
River Birch	*Betula nigra*	50 to 80	H	M	M	H	H	L
Gray Birch	*Betula populifolia*	33	M	L	M	L	L	L
White Ash	*Fraxinus americana*	75 to 100	H	L	M	H	H	H
Green Ash	*Fraxinus pennsylvanica*	30 to 50	H	L	H	H	L	H
American Sycamore	*Platanus occidentalis*	110 to 120	H	L	H	H	M	L
Cottonwood	*Populus deltoides*	80 to 100	H	L	M	H	H	M
Swamp White Oak	*Quercus bicolor*	60 to 70	H	M	L	H	L	H
Pin Oak	*Quercus palustris*	40 to 80	M	M	H	H	M	H
Black Willow	*Salix nigra*	30 to 60	H	L	L	M	H	L
Basswood	*Tilia americana*	65 to 80	M	H	L	M	M	M
Evergreen Trees								
Eastern redcedar	*Juniperus virginiana*	20 to 50	H	H	H	H	M	H
Tamarack	*Larix laricina*	50 to 80	M	L	L	M	H	L
White Spruce	*Picea glauca*	60 to 70	M	M	H	M	M	H
White Pine	*Pinus strobus*	60 to 100	M	H	M	L	H	M
Northern White Cedar	*Thuja occidentalis*	50 to 65	M	M	M	M	H	M
Eastern Hemlock	*Tsuga canadensis*	65 to 80	L	H	H	L	H	H
Shrubs								
Shadbush	*Amelanchier candensis*	20 to 30	H	M	H	H	H	H
Silky Dogwood	Cornus amomum	7 to 10	H	L	M	H	M	H
Hawthorn	Crataegus L.	5 to 25	H	L	H	H	M	H
Winterberry	Ilex verticillata	10	H	M	M	H	H	H
Bankers Dwarf Willow	Salix cotteti	6	H	M	M	H	L	L
Pussy Willow	Salix bicolor	26	H	M	M	H	H	L
Streamco Purpleosier Willow	Salix purpurea	10 to 18	H	H	L	H	L	M
Elderberry	Sambucus canadensis	12	H	L	M	M	M	H
Highbush Blueberry	Vaccinium corymbosum	6 to 12	H	M	M	H	H	H
Nannyberry	Viburnum lentago	33	M	M	M	M	H	H

Source: USDA, Natural Resources Conservation Service

TABLE 6A - NATIVE RIPARIAN VEGETATION

RECOMMENDED USES: W WILDLIFE
H HORTICULTURE AND LANDSCAPING
C CONSERVATION AND RESTORATION
D DOMESTIC LIVESTOCK FORAGE

NATIVE REGIONS: M MOUNTAINS
P PIEDMONT
C COASTAL PLAIN

MINIMUM LIGHT REQUIREMENTS: S FULL SHADE
P PARTIAL SUN
F FULL SUN

VEGETATION ZONES 1 EMERGENT
2 RIVERSIDE THICKET
3 SATURATED THICKET
4 WELL-DRAINED

Native Riparian Plants																			
Scientific Name	Common Name	Uses					Region				Light				Zone				
		W	H	C	D		M	P	C		S	P	F		1	2	3	4	
Herbaceous plants																			
Acorus americanus (A. calamus)	sweet flag		X	x			x	x	x			x	x		x				
Amsonia tabernaemontana	blue star		X					x	x		x	x					x	x	
Arisaema triphyllum	Jack-in-the-pulpit		X				x	x	x		x						x	x	
Asarum canadense+	wild ginger		X	x			x	x	x		x							x	
Asclepias incarnata	swamp milkweed	x	X	x			x	x	x			x	x		x	x			
Aster novae-angliae	New England aster		X	x			x					x	x				x		
Aster novi-belgii	New York aster	x	X	x					x			x	x		x	x			
Aster umbellatus	flat-top white aster		X	x			x	x				x	x				x		
Bidens cernua+	nodding beggar-ticks	x	X	x			x	x	x			x	x		x	x			
*Boltonia asteroides**	aster-like boltonia		x						x				x		x	x	x		
Caltha palustris	marsh marigold		x	x			x		x			x	x				x		
Chamaecrista	partridge pea			x			x	x	x				x					x	

Native Riparian Plants																		
Scientific Name	Common Name	Uses					Region				Light				Zone			
		W	H	C	D		M	P	C		S	P	F		1	2	3	4
fasciculata+																		
Chelone glabra	white turtlehead		x	x			x	x	x		x	x				x	x	
Chrysogonum virginianum	green and gold		x	x			x	x	x		x							x
Coreopsis tripteris	tall coreopsis		x	x			x	x	x			x	x			x	x	x
Delphinium tricorne	dwarf larkspur		x				x	x			x	x						x
Dicentra cucullaria	Dutchman's breeches		x				x	x			x							x
Equisetum hyemale	horsetail, scouring rush			x			x	x	x		x	x	x			x	x	x
Eupatorium coelestinum	Mistflower	x	x	x			x	x	x		x	x	x				x	x
Eupatorium fistulosum	Joe Pye weed	x	x	x			x	x	x			x	x			x	x	x
Eupatorium perfoliatum	common boneset			x			x	x	x			x	x		x	x	x	
Helenium autumnale	Sneezeweed	x	x	x			x	x	x			x	x		x	x	x	
Helianthus decapetalus	ten-petaled sunflower	x	x	x			x	x	x			x	x				x	x
Heliopsis helianthoides	oxeye sunflower	x	x	x			x	x	x			x	x				x	x
Hibiscus moscheutos	Eastern rosemallow	x	x	x			x	x	x				x		x	x		
Iris virginica	Virginia blue flag		x	x				x	x			x	x		x	x		
Kosteletskya virginica	seashore mallow	x		x					x				x		x	x		
Lilium superbum	Turk's cap lily		x				x	x	x			x	x				x	x
Lobelia cardinalis	cardinal flower	x	x	x			x	x	x			x	x		x	x	x	
Lobelia siphilitica	great blue lobelia	x	x	x			x	x	x		x	x					x	x
Maianthemum racemosa	false Solomon's seal		x	x			x	x	x		x	x					x	x
Mertensia virginica	Virginia bluebells		x	x			x	x			x	x					x	x
Mimulus ringens	Monkeyflower		x	x			x	x	x				x		x	x	x	
Monarda didyma	bee balm	x	x	x			x				x	x					x	x
Nymphaea odorata	American water lily	x	x	x			x	x	x				x		x			
Oenothera fruticosa	Sundrops	x	x	x			x	x	x				x		x	x	x	x
Peltandra virginica	arrow arum	x	x	x				x	x			x	x		x	x		
Phlox divaricata	woodland phlox		x	x			x	x				x					x	x
Phlox paniculata	summer phlox		x	x			x	x	x			x	x				x	x
Podophyllum	Mayapple	x	x	x			x	x	x			x	x					x

Native Riparian Plants																			
Scientific Name	Common Name	Uses					Region				Light				Zone			
		W	H	C	D		M	P	C		S	P	F		1	2	3	4
peltatum+																		
Polemonium reptans	Jacob's ladder		x				x	x	x		x	x						x
Pontederia cordata	pickerel weed	x	x	x				x	x				x		x			
Rhexia virginica	Virginia meadow-beauty	x		x			x	x	x				x				x	
Rudbeckia laciniata	cut-leaved coneflower	x	x	x			x	x	x			x	x			x	x	x
Sagittaria latifolia	broadleaf arrowhead	x	x	x			x	x	x				x		x	x		
Saururus cernuus	lizard's tail		x	x			x	x	x			x	x		x	x		
Senecio aureus+	golden ragwort	x		x			x	x	x		x	x				x	x	x
Solidago rugosa+	rough-stemmed goldenrod	x		x			x	x	x			x	x			x	x	x
Verbena hastata	blue vervain	x		x			x	x				x	x			x	x	
Vernonia noveboracensis	New York ironweed	x	x	x			x	x	x			x	x			x	x	x
Viola cucullata	marsh blue violet	x	x	x			x	x	x			x	x				x	
Viola pubescens	yellow violet	x	x	x			x	x			x	x						x
Zephranthes atamasco	Atamasco lily		x	x					x			x	x			x	x	x
Ferns and fern allies																		
Athyrium asplenioides	Southern ladyfern		x	x			x	x	x		x						x	x
Botrychium virginianum	Rattlesnake fern		x				x	x	x		x	x						x
Onoclea sensibilis+	sensitive fern		x	x			x	x	x			x	x				x	x
Osmunda cinnamomea	cinnamon fern		x	x			x	x	x		x	x				x	x	
Osmunda regalis	royal fern		x	x			x	x	x			x					x	x
Polystichium acrostichoides	Christmas fern		x	x			x	x	x		x							x
Thelypteris palustris	marsh fern		x				x	x	x			x	x		x	x	x	
Woodwardia virginica+	Virginia chain fern		x	x					x		x	x	x		x	x		
Grasses, sedges, reeds																		
Agrostis perennans	autumn bentgrass			x			x	x	x		x	x	x		x	x	x	x
Andropogon gerardii	big bluestem	x	x	x	x		x	x				x	x			x	x	

Native Riparian Plants																		
Scientific Name	Common Name	Uses					Region				Light				Zone			
		W	H	C	D		M	P	C		S	P	F		1	2	3	4
Andropogon glomeratus	bushy bluestem		x	x			x	x	x			x	x				x	
Arundinaria gigantea	wild cane, river cane	x		x			x				x	x	x			x	x	x
Carex crinita var. crinita	long hair sedge	x	x	x			x	x	x			x	x		x	x	x	
Carex lurida	sallow sedge	x		x			x	x	x			x	x		x	x	x	
Carex stricta	tussock sedge	x		x			x	x	x			x	x		x	x	x	
Chasmanthium latifolium	river oats, spanglegrass		x	x			x	x	x		x	x	x			x	x	x
Dichanthelium clandestinum	deer-tongue	x		x	x		x	x	x			x	x		x	x	x	x
Dichanthelium commutatum	variable panicgrass	x	x	x	x		x	x	x		x	x						x
Dulichium arundinaceum	dwarf bamboo	x		x	x		x	x	x			x	x		x	x	x	
Elymus hystrix (Hystrix patula)	Bottlebrush grass	x	x				x	x	x		x	x	x					x
Elymus virginicus	Virginia wild rye	x		x			x	x	x		x	x				x	x	x
Juncus canadensis	Canada rush	x		x				x	x			x	x		x	x	x	
Juncus effusus	soft rush	x		x			x	x	x			x	x		x	x	x	
Leersia oryzoides	rice cutgrass	x		x			x	x	x			x	x		x	x	x	
Panicum virgatum	switch grass	x	x	x			x	x	x			x	x		x	x	x	
Saccharum giganteum	giant plumegrass	x	x	x				x	x			x	x		x	x	x	
Scirpus cyperinus	woolgrass bulrush	x	x	x			x	x	x			x	x		x	x	x	
Sparganium americanum	American bur-reed	x		x			x	x	x			x	x		x			
Tripsacum dactyloides	gama grass	x	x	x	x		x	x	x			x	x		x	x	x	x
Typha latifolia	broad-leaved cattail	x		x			x	x	x				x		x			
Zizania aquatica	wild rice	x	x	x					x				x		x			
Vines																		
Bignonia capreolata	Crossvine	x	x				x	x	x		x	x				x	x	x
Celastrus scandens	climbing bittersweet	x	x				x	x	x		x	x	x					x
Clematis virginiana	virgin's bower		x				x	x	x			x	x		x	x	x	x
Parthenocissus	Virginia creeper	x	x	x			x	x	x			x	x			x	x	x

Native Riparian Plants																			
Scientific Name	Common Name	Uses					Region				Light				Zone			
		W	H	C	D		M	P	C		S	P	F		1	2	3	4
quinquefolia																		
Shrubs																		
Alnus serrulata	common alder	x	x	x			x	x	x		x	x	x		x	x	x	
Aronia arbutifolia	red chokeberry		x	x			x	x	x		x	x				x	x	x
Aronia melanocarpa	black chokeberry		x	x			x	x	x			x	x			x	x	x
Callicarpa americana	American beautyberry	x	x						x		x	x					x	x
Cephalanthus occidentalis	Buttonbush		x	x			x	x	x			x	x		x	x		
Clethra alnifolia	sweet pepper-bush	x	x	x					x		x	x					x	
Cornus amomum	silky dogwood	x		x			x	x	x		x	x				x	x	
Hydrangea arborescens	wild hydrangea		x				x	x	x		x	x						x
Ilex decidua	Possumhaw	x	x	x				x	x		x	x				x	x	x
Ilex verticillata	Winterberry	x	x	x			x	x	x			x	x			x	x	x
Itea virginica	Virginia willow	x	x	x					x		x	x				x	x	
Leucothoe racemosa	fetterbush, sweetbells		x	x			x	x	x			x	x			x	x	
Lindera benzoin	Spicebush	x	x	x			x	x	x		x						x	x
Myrica cerifera	Southern wax myrtle	x	x	x					x		x	x			x	x	x	x
Rhododendron viscosum	swamp azalea		x	x			x	x	x			x	x			x	x	
Rubus allegheniensis	Alleghany blackberry	x	x	x			x	x					x			x	x	x
Salix sericea	silky willow		x	x			x	x	x			x	x			x	x	
Sambucus canadensis	common elderberry	x	x	x			x	x	x				x			x	x	x
Spiraea alba	narrow-lvd. Meadowsweet	x	x	x			x						x			x	x	
Spiraea latifolia	broad-lvd. Meadowsweet	x	x	x			x						x			x	x	x
Vaccinium corymbosum	highbush blueberry	x	x	x			x	x	x		x	x	x			x	x	x
Viburnum dentatum	So. arrow-wood viburnum	x	x	x			x	x	x			x	x					
Viburnum prunifolium	black-haw viburnum	x	x	x			x	x	x			x	x					

Native Riparian Plants																		
Scientific Name	Common Name	Uses					Region				Light				Zone			
		W	H	C	D		M	P	C		S	P	F		1	2	3	4
Small trees																		
Amelanchier arborea	downy serviceberry	x	x	x			x	x	x			x	x					x
Amelanchier canadensis	Canada serviceberry	x	x	x			x	x	x				x			x	x	x
Amelanchier laevis	smooth serviceberry	x	x	x			x					x	x					x
Asimina triloba	paw paw	x	x	x			x	x	x		x	x					x	x
Cornus alternifolia	alternate-leaf dogwood	x	x	x			x	x			x	x						x
Crateagus flava	October haw	x	x				x	x	x			x	x				x	
Morus rubra	red mulberry	x	x	x			x	x	x		x	x					x	x
Ostrya virginiana	Eastern hop-hornbeam		x				x	x	x		x	x						x
Persea borbonia	redbay, sweet bay		x	x					x		x	x					x	
Rhus glabra	smooth sumac	x	x	x			x	x	x				x				x	x
Salix nigra	black willow			x			x	x	x			x	x		x	x	x	
Medium to Large Trees																		
Acer rubrum	red maple		x	x			x	x	x				x		x	x	x	x
Betula lenta	sweet birch, black birch	x	x	x			x	x				x	x				x	x
Betula nigra	river birch	x	x	x			x	x	x				x			x	x	
Diospyros virginiana	Persimmon	x	x	x			x	x	x		x	x	x			x	x	x
Fraxinus americana	white ash	x	x				x	x	x			x	x			x	x	x
Fraxinus pensylvanica	green ash	x	x	x			x	x	x			x	x			x	x	
Juglans nigra	black walnut	x		x			x	x	x			x	x			x	x	x
Liquidambar styraciflua	Sweetgum		x	x			x	x	x		x	x	x			x	x	x
Liriodendron tulipifera	tulip-tree, tulip poplar	x	x	x			x	x	x				x				x	x
Nyssa aquatica	water tupelo	x	x	x					x			x	x		x			
Nyssa sylvatica	black gum	x	x	x			x	x	x			x	x			x	x	x
Oxydendrum arboreum	Sourwood		x				x	x	x			x					x	x
Pinus taeda	loblolly pine	x	x	x				x	x				x			x	x	x
Platanus occidentalis	Sycamore			x			x	x	x			x	x			x	x	x
Quercus bicolor	swamp white oak	x		x			x	x	x		x	x				x	x	

Native Riparian Plants																			
Scientific Name	Common Name	Uses					Region				Light				Zone			
		W	H	C	D		M	P	C		S	P	F		1	2	3	4
Quercus laurifolia	swamp laurel oak	x		x					x			x	x			x	x	
Quercus michauxii	swamp chestnut oak	x	x					x	x			x	x			x	x	x
Quercus nigra	water oak	x		x					x		x	x				x	x	x
Quercus palustris	pin oak	x	x	x			x	x	x		x	x				x	x	
Quercus phellos	willow oak	x	x	x				x	x			x	x			x	x	x
Taxodium distichum	Bald cypress		x	x					x				x		x			
+May be aggressive in garden setting.																			
*Due to the rarity and sensitivity of habitat in Virginia, these species are recommended for horticultural use only.																			
Planting these species in natural areas could be detrimental to the survival of native populations.																			

Table 7 - Recommended Herbaceous ~~Grass~~ Seed~~ing~~ Mixture~~s~~ for Riparian Buffers

~~*Recommended Use*~~	~~*Common Name*~~	~~*Variety*~~	~~*Seeding Rate (lb. pure live seed/acre)*~~
~~Wildlife Habitat~~	~~Switchgrass~~	~~Shelter~~	~~2.0~~
	~~Big Bluestem~~	~~Niagara~~	~~3.2~~
	~~Eastern gamagrass~~	~~Pete~~	~~1.0~~
	~~Indiangrass~~	~~Rumsey or NE 54~~	~~1.0~~
	~~Little Bluestem~~	~~Aldous or Camper~~	~~2.1~~
	~~Sideoats grama~~	~~El Reno or Trailway~~	~~1.0~~
		~~Total~~	~~10.0~~
~~Wildlife Habitat~~	~~Switchgrass~~	~~Shelter~~	~~8.0~~
	~~Deertongue~~	~~Tioga~~	~~2.0~~
	~~White clover~~	~~common~~	~~1.0~~
		~~Total~~	~~11.0~~
~~Erosion Control~~	~~Birdsfoot trefoil or~~	~~Empire~~	~~3.0~~
	~~White clover~~	~~Common~~	
	~~Orchardgrass~~	~~Pennlate~~	~~6.0~~
	~~Timothy~~	~~Climax~~	~~5.0~~
	~~Perennial ryegrass~~	~~Turf type~~	~~1.0~~
		~~Total~~	~~15.0~~

~~Source: USDA, Natural Resources Conservation Service~~

Common Name	Scientific Name	Seeding Rate (lb. pure live seed per acre)
Annual Rye	*Lolium multiflorum*	45.00
Foxtail Millet	*Setaria italica*	45.00
Blunt Broom Sedge	*Carex scoparia*	0.20
Squarrose Sedge	*Carex squarrosa*	0.20
Fox Sedge	*Carex vulpinoidea*	0.20
Chufa	*Cyperus esculentus*	0.20
Soft Rush	*Juncus effusus*	0.20
Path Rush	*Juncus tenuis*	0.20

Riverbank Wild Rye	*Elymus riparius*	10.00
Virginia Wild Rye	*Elymus virginicus*	10.00
Deer Tongue Grass	*Panicum clandestinum*	10.00
Smooth Panic Grass	*Panicum dichotomiflorum*	10.00
Thimbleweed	*Anemone virginiana*	0.10
New England Aster	*Aster novae-angliae*	0.10
Heath Aster	*Aster pilosus*	0.10
Zig Zag Aster	*Aster prenanthoides*	0.10
Turkscap Lily	*Lilium superbum*	0.10
Early Goldenrod	*Solidago juncea*	0.10
Joe Pye Weed	*Eupatorium fistulosus*	0.10
Boneset	*Eupatorium perfoliatum*	0.10
Grass Leaved Goldenrod	*Euthamia graminifolia*	0.10
Canadian Goldenrod	*Solidago canadensis*	0.10
Showy Goldenrod	*Solidago speciosa*	0.10
New York Ironweed	*Vernonia noveboracensis*	0.10
Golden Alexanders	*Zizia aurea*	0.10
Common Milkweed	*Asclepias syriaca*	0.20
Beggar Ticks	*Bidens frondosa*	0.20
Common Sneezeweed	*Helenium autumnale*	0.20
Narrow-Leaf Sunflower	*Helianthus angustifolius*	0.20
Sensitive Fern	*Onoclea sensibilis*	0.20
Penstemon	*Penstemon digitalis*	0.20
Blue Vervain	*Verbena hastata*	0.20
Wingstem	*Verbesina alternifolia*	0.20
Lance Leaved Coreopsis	*Coreopsis lanceolata*	0.20
Oxeye Sunflower	*Heliopsis helianthoides*	0.20
PA Smartweed	*Polygonum Pensylvanicum*	0.20
Black Eyed Susan	*Rudbeckia hirta*	0.20
Wild Senna	*Senna hebecarpa*	0.20

7.350 FOREST MANAGEMENT PLAN

A Forest Management Plan as required by the Zoning Ordinance shall be required and submitted to the County for approval for tracts of land three (3) acres or larger in size. The County acknowledges the fact that the management and subsequent harvesting of commercially value timber resources is a bona fide form of land use which is an important component of the County's economy. However, in order to help assure the protection of the County's mountain and steep slopes and other environmentally sensitive areas, a Forest Management Plan (FMP) is required to be on file in the State Forester's office and a copy kept on site during the entire length of logging.

The purpose of the FMP is to establish the tract location, describe the Best Management Practices (BMP's) required for structural stabilization and re-vegetation of all exposed mineral soil sites. The following information is required and must be filed with the Virginia Department of Forestry prior to the initiation of any timber harvest in the Mountainside Development Overlay District.

A. County base map at 1" = 200', showing tract boundaries, timber type lines, water bodies, topography and acreage to be harvested. These maps are available through the Loudoun County Office of Mapping and Geographic Information.

B. Identify all streams, their headwaters and the 35-foot riparian stream buffers, and identify a Streamside Management Zone (SMZ) at least 50 feet on either side of the stream.

C. Approximate location of all decks, haul road, and primary skid trails.

D. If grading is necessary in the road construction process, a detailed map showing location, topography and information addressing its stabilization are required. Should land disturbance exceed 10,000 square feet, a grading permit will be required.

E. Identify species composition, stocking, regeneration, soils, stand history, unique natural features, percent slope, quality and growth rate.

F. Harvest type (i.e., selective, shelterwood, diameter limit cut, clear-cut, etc.)

G. Means of regeneration (natural or artificial).

H. Means of stabilization (crawler tractor, skidder, loader, etc.)

I. Recommendations regarding the viability of a fuel wood harvest.

J. Statement that all BMP's shall be done in accordance with those outlined by the Virginia Department of Forestry and immediately upon logging completion.

K. Plan shall be signed by the drafting professional forester.

L. Notification call to the County Urban Forester's office at least 24 hours prior to commencement of the logging operation.

M. Notification call to the Urban Forester's office immediately upon installation of all BMP's.

7.400 LANDSCAPE PLANS

Where required by the Zoning and/or Subdivision and Site Plan Ordinances, or where deemed necessary by the County as a part of a rezoning or a condition of a special exception or variance, an applicant shall submit a landscaping plan as specified within the Zoning Ordinance, and Chapter 8 of this manual. The County recommends that tree and shrub species be native and have multiple values such as biomass, nuts, fruits, browse, nesting and aesthetics.

A. The landscaping plan shall be overlain upon the site plan or construction plans and profiles submission, whichever is applicable, to illustrate the following:

1. Accurate location and species of each plant.

2. Planting shall not be allowed within sight distance easements or other easements where the plantings may be detrimental to the purpose of the easement.

3. Required landscape buffers.

B. Landscape and tree canopy calculations shall be provided and may be presented in tabular form per the following examples:

TREE CANOPY CALCULATIONS			
TREE TYPE	**QUANTITY**	**ALLOWANCE**	**TOTAL**
Acer Rubrum	15	250	3,750
Fraxinus Pensulvanica ‘Marshall's Seedless’'	16	250	4,000
Liquidambar Styraciflua	18	250	4,500
Platanus Acerifolia	14	250	3,500
Pinus Nigra	68	250	17,000
Pinus Rigida	27	250	6,750
Pinus Strobus	38	250	9,500
Pinus Sylvesteris	37	250	9,250
Zelkova Serrata	24	250	6,000
TOTAL PROPOSED TREE CANOPY ALLOWANCE			**64,250 sf**

LANDSCAPE TABULATION			
Total Site Area	8.37 ac	Or	364,597 sf
Total Pavement Area	.74 ac	Or	32,234 sf.
Total Easement Area	.33 ac	Or	14,374 sf.
Net Site Area	7.099 ac	Or	309,232 sf.
Total Required Tree Canopy	1.42 ac	Or	61,844 sf. (20%)
Total Proposed Tree Canopy	1.475 ac	Or	64,250 sf. (20.8%)

C. Plant schedule to include: (Refer to sample planting schedule below.)

1. Key or symbol of plant material.

2. Plant name (botanical and common).

3. Quantity of each species.

4. Size (caliper, height, or spread).

5. Type of root stock to be planted--balled and burlapped (B&B), bareroot, container.

6. Reference the guidelines for planting and maintenance of the materials outlined in the current Virginia Erosion and Sediment Control Handbook.

Sample Landscape Plan Planting Schedule

Key	Botanical Name	Common Name	Quantity	Size	Remarks
C	Cornus florida	Flowering Dogwood	5	6'- 8'	B&B
Q	Quercus alba	White Oak	10	2 1/2" caliper	B&B
A	Acer rubrum	Red Maple	35	6'- 8'	B&B

Table 8 - Tree Canopy for Deciduous Trees

Botanical Name	Common Name	Native	Minimum Planting Area (ft^2)	1.0" Caliper	2.0" Caliper	3.0" Caliper
Acer Rubrum 'Columnare'	red maple	Yes	55	45	55	75
Carpinus betulus 'Fastigiata'	fastigiate European hornbeam		55	45	55	75
Fagus sylvatica ' Fastigiata'	fastigiate European beech		55	45	55	75
Ginkgo biloba 'Sentry'	sentry ginkgo		55	45	55	75
Quercus robur 'Fastigiata'	fastigiate European oak		55	45	55	75
Acer campestre	hedge maple		55	75	100	125
Acer ginnala	amur maple		55	75	100	125
Acer palmatum	Japanese maple		55	75	100	125
Amelanchier arborea	downey serviceberry		55	75	100	125
Amelanchier laevis	Allegheny serviceberry		55	75	100	125
Carpinus caroliniana	American Hornbeam		55	75	100	125
Cercis canadensis	Redbud		55	75	100	125
Chionanthus virginicus	Fringetree		55	75	100	125
Cornus florida	flowering dogwood		55	75	100	125
Cornus kousa	kousa dogwood		55	75	100	125
Halesia carolina	Carolina silverbell		55	75	100	125
Magnolia stellata	star magnolia		55	75	100	125
Magnolia virginiana	sweetbay magnolia		55	75	100	125
Malus spp.	Crabapples		55	75	100	125
Oxydendrum arboreum	Sourwood		55	75	100	125
Prunus cerasifera	flowering plum		55	75	100	125
Prunus x incam 'Okame'	Okame cherry		55	75	100	125
Stewartia koreana	Korean stewartia		55	75	100	125
Stewartia ovata	mountain stewartia		55	75	100	125
Stewartia pseudocamellia	Japanese stewartia		55	75	100	125
Styrax japonicus	Japanese snowbell		55	75	100	125
Aesculus hippocastanum	Horsechestnut		90	130	150	175
Betula nigra	river birch		90	130	150	175
Castanea mollissima	Chinese chestnut		90	130	150	175
Celtis occidentalis	Hackberry		90	130	150	175
Cercidiphyllum japonicum	Katsuratree		90	130	150	175
Diospyros virginiana	Persimmon		90	130	150	175

Eucommia ulmoides	hardy rubber tree		90	130	150	175
Fagus sylvatica	European beech		90	130	150	175
Fraxinus pennsylvanica	green ash		90	130	150	175
Marshall's seedless'			90	130	150	175
Botanical Name	Common Name	Native	Minimum Planting Area (ft^2)	1.0" Caliper	2.0" Caliper	3.0" Caliper
Patmore'			90	130	150	175
Summit'			90	130	150	175
Gleditsia triancanthos inermis	thornless honeylocust		90	130	150	175
'Imperial'			90	130	150	175
'Skyline'			90	130	150	175
'Shademaster'			90	130	150	175
Gymnocladus dioicus	Kentucky coffeetree		90	130	150	175
Juglans nigra	black walnut		90	130	150	175
Koelreuteris paniculata	goldenrain tree		90	130	150	175
Larix decidual	European larch		90	130	150	175
Maclura pomiferal	osage orange (male only)		90	130	150	175
Magnolia acuminata	cucumber tree		90	130	150	175
Magnolia macrophylla	Bigleaf magnolia		90	130	150	175
Metasequoia glyptostroboides	dawn redwood		90	130	150	175
Nyssa sylvatica	black gum, tupelo		90	130	150	175
Phellodendron amurensel	amur corktree (male only)		90	130	150	175
Prunus serrulata 'Kwanzan'	Kwanzan cherry		90	130	150	175
Prunus sargentii	sargent cherry		90	130	150	175
Prunus subhirtella 'Pendula'	weeping Japanese cherry		90	130	150	175
Prunus yedoensis	yoshino cherry		90	130	150	175
Pyrus calleryana	callery pear		90	130	150	175
'Aritocrat'			90	130	150	175
'Autumn blaze'			90	130	150	175
'Chanticleer'			90	130	150	175
'Redspire'			90	130	150	175
'Whitehouse'			90	130	150	175
Salix bablonica	weeping willow		90	130	150	175
Taxodium distichum	bald cypress		90	130	150	175
Tilia cordata	littleleaf linden		90	130	150	175
'Glenleven'			90	130	150	175
'Greenspire'			90	130	150	175
Acer rubrum	red maple		130	150	200	250

Acer saccharum	sugar maple		130	150	200	250
Carya illinoensis	Pecan		130	150	200	250
Carya ovata	shagbark hickory		130	150	200	250
Fagus grandifolia	American beech		130	150	200	250
Fraxinus americana	white ash		130	150	200	250
Ginkgo biloba	ginkgo (male only)		130	150	200	250
Liquidambar styraciflua	Sweetgum		130	150	200	250
Botanical Name	Common Name	Native	Minimum Planting Area (ft^2)	1.0" Caliper	2.0" Caliper	3.0" Caliper
Liriodendron tulipfera	tulip poplar		130	150	200	250
Platanus x acerifolia	London planetree		130	150	200	250
Platanus occidentalis	Sycamore		130	150	200	250
Quercus acutissima	sawtooth oak		130	150	200	250
Quercus alba	white oak		130	150	200	250
Quercus bicolor	swamp white oak		130	150	200	250
Quercus coccinea	scarlet oak		130	150	200	250
Quercus imbricaria	shingle oak		130	150	200	250
Quercus palustris	pin oak		130	150	200	250
Quercus phellos	willow oak		130	150	200	250
Quercus rubra (borealis)	northern red oak		130	150	200	250
Sophora japonica	Japanes pagoda tree		130	150	200	250
Tilia americana	American linden, basswood		130	150	200	250
'Redmond'			130	150	200	250
'Legend'			130	150	200	250
Ulmus hollandica 'Groenveldt'	Groenveldt elm		130	150	200	250
Ulmus parvifolia	Chinese elm		130	150	200	250
Zelkova serrata	Japanese zelkova		130	150	200	250

Table 9 - Tree Canopy for Evergreen Trees (10 Year Canopy)

Botanical Name	Common Name	Native	Minimum Planting Area (ft^2)	6.0 ft. Height	8.0 ft. Height	10.0 ft. Height
Ilex x attenuate 'Fosteri'	Foster's holly		35	45	55	75
Ilex x 'Nellie R. Stevens'	Nellie Stevens holly		35	45	55	75
Juniperus chinensis	Chinese juniper		35	45	55	75
'Denserecta'			35	45	55	75

'Hetzi columnaris'			35	45	55	75
'Keteleeri'			35	45	55	75
'Robusta green'			35	45	55	75
'Columnaris'			35	45	55	75
'Torulosa'			35	45	55	75
'Gray Gleam'			35	45	55	75
'Erecta Glauca'			35	45	55	75
Juniperus virginiana 'Princeton Sentry'	Eastern redcedar		35	45	55	75
Taxus baccata 'Fastigata'	upright Irish yew		35	45	55	75
Botanical Name	Common Name	Native	Minimum Planting Area (ft^2)	6.0 ft. Height	8.0 ft. Height	10.0 ft. Height
Thuja occidentalis 'Nigra'	dark green American arborvitae		35	45	55	75
Thuja orientalis (Platycladus orientalis)	columnar oriental arborvitae		35	45	55	75
Abies concolor	white fir		55	75	100	125
Calocedrus decurrens	incense cedar		55	75	100	125
Chamaecyparis lawsoniana	Lawson false cypress		55	75	100	125
Chamaecyparis obtusa	Hinoki false cypress		55	75	100	125
Chamaecyparis pisifera	plume sawara false cypress		55	75	100	125
Cunninghamia lanceolata	China fir		55	75	100	125
Ilex aquifolium	English holly		55	75	100	125
Ilex opaca	American holly		55	75	100	125
Cryptomeria japonica	Japanese cryptomeria		55	75	100	125
X Cupressocyparis leylandii	leyland cypress		55	75	100	125
Juniperus virginiana	Eastern redcedar		55	75	100	125
'Canaert'			55	75	100	125
'Manhattan Blue'			55	75	100	125
Picea glauca	white spruce		55	75	100	125
Picea omorika	Serbian spruce		55	75	100	125
Picea orientalis	oriental spruce		55	75	100	125
Picea pungens	Colorado blue spruce		55	75	100	125
Pinus bungeana	lace-bark pine		55	75	100	125
Pinus parviflora	Japanese white pine		55	75	100	125
Pinus thunbergii	Japanes black pine		55	75	100	125
Pseudotsuga menziesii	Douglas fir		55	75	100	125
Taxus cuspidata 'Capitata'	pyramidal Japanese yew		55	75	100	125
Tsuga canadensis	Canadian hemlock		55	75	100	125

Tsuga caroliniana	Carolina hemlock		55	75	100	125
Cedrus atlantica	atlas cedar		90	125	150	175
Picea abies	Norway spruce		90	125	150	175
Pinus echinata	shortleaf pine		90	125	150	175
Pinus nigra	Austrian pine		90	125	150	175
Magnolia grandiflora	Southern magnolia		110	125	150	175
Pinus rigida	pitch pine		110	125	150	175
Pinus stroba	white pine		110	125	150	175
Pinus virginiana	Virginia pine		90	125	150	175
Pinus taeda	loblolly pine		110	125	150	175

Table 10: NATIVE SHRUBS

W = Wildlife	M = Mountains	S = Full Shade	L = Low Moisture
H = Horticulture and Landscaping	P = Piedmont	P = Partial Sun	M = Moderate Moisture
C = Conservation and Restoration	C = Coastal Plain	F = Full Sun	H = High Moisture

Native Shrubs																	
Scientific Name	**Common Name**	**Uses**					**Region**				**Light**				**Moisture**		
		W	**H**	**C**	**D**		**M**	**P**	**C**		**S**	**P**	**F**		**L**	**M**	**H**
Shrubs																	
Alnus serrulata	Common alder	x	x	x			x	x	x		x	x	x				x
Aronia arbutifolia	Red chokeberry		x	x			x	x	x		x	x				x	x
Aronia melanocarpa	Black chokeberry		x	x			x	x	x			x	x		x	x	x
Baccharis halimifolia	High tide bush		x	x					x				x		x	x	x
Callicarpa americana	American beautyberry	x	x						x		x	x				x	
Castanea pumila	Allegheny chinkapin	x	x	x			x	x	x		x	x	x		x		
Ceanothus americanus	New Jersey tea	x	x	x			x	x	x			x	x		x		

Native Shrubs																		
Scientific Name	**Common Name**	**Uses**					**Region**				**Light**				**Moisture**		
		W	**H**	**C**	**D**		**M**	**P**	**C**		**S**	**P**	**F**		**L**	**M**	**H**
Cephalanthus occidentalis	Buttonbush		x	x			x	x	x			x	x				x
Clethra alnifolia	Sweet pepper-bush	x	x	x					x		x	x				x	x
Cornus amomum	Silky dogwood	x		x			x	x	x		x	x				x	x
Crataegus crus-galli	Cockspur hawthorn	x	x	x			x	x	x			x	x		x	x	
Gaultheria procumbens	Wintergreen	x	x				x	x	x		x	x			x	x	
Gaylussacia baccata	Black huckleberry	x	x	x			x	x	x		x	x			x	x	
Gaylussacia frondosa	Dangleberry	x	x	x			x		x		x	x	x		x		
Hamamelis virginiana	Witch hazel		x	x			x	x	x		x	x			x	x	
Hydrangea arborescens	Wild hydrangea		x				x	x	x		x	x				x	
Ilex decidua	Deciduous holly, possumhaw	x	x	x				x	x		x	x				x	
Ilex glabra	Inkberry	x	x	x					x		x	x			x	x	
Ilex verticillata	Winterberry	x	x	x			x	x	x			x	x			x	x
Ilex vomitoria	Yaupon holly	x	x	x					x		x	x	x		x		
Itea virginica	Virginia willow	x	x	x					x		x	x					x
Iva fruitescens	Marsh elder		x	x					x				x		x	x	
Kalmia latifolia	Mountain laurel	x	x	x			x	x	x		x	x				x	
Leucothoe axillaris	Coastal dog-hobble		x						x		x					x	
Leucothoe racemosa	Fetterbush, sweetbells		x	x			x	x	x			x	x			x	
Lindera benzoin	Spicebush	x	x	x			x	x	x		x					x	
Lyonia lucida	Shining fetterbush		x	x					x		x	x				x	
Myrica cerifera	Southern wax myrtle	x	x	x					x		x	x			x	x	
Myrica heterophylla	Southern bayberry	x	x	x					x		x	x			x	x	

Native Shrubs																		
Scientific Name	**Common Name**	**Uses**					**Region**				**Light**				**Moisture**			
		W	**H**	**C**	**D**		**M**	**P**	**C**		**S**	**P**	**F**		**L**	**M**	**H**	
Myrica pensylvanica	Northern bayberry	x	x	x					x				x		x	x	x	
Pieris floribunda	Evergreen mountain fetterbush		x	x			x				x					x		
Rhododendron atlanticum	Dwarf azalea	x	x						x			x				x		
Rhododendron calendulaceum	Flame azalea		x				x					x				x		
Rhododendron catawbiense	Catawba rhododendron		x	x			x	x				x	x			x		
Rhododendron cumberlandense	Cumberland flame azalea		x				x					x				x		
Rhododendron maximum	Great rhododendron rose bay	x	x	x			x	x			x	x				x	x	
Rhododendron periclymenoides	Pinxter flower		x	x			x	x	x		x	x				x	x	
Rhododendron prinophyllum	Rose azalea	x	x				x				x	x	x		x	x		
Rhododendron viscosum (*R. serrulata*)	Swamp azalea		x	x			x	x	x			x	x			x	x	
Rhus aromatica	Fragrant sumac		x				x	x				x	x		x			
Rhus copallinum	Winged sumac, flameleaf sumac	x	x	x			x	x	x		x	x			x			
Rosa carolina	pasture rose	x		x			x	x	x			x	x		x	x		
Rubus allegheniensis	Alleghany blackberry	x	x	x			x	x					x		x			
Rubus odoratus	purple flowering raspberry			x			x					x				x		
Salix humilis	prairie willow		x	x			x	x	x				x		x			
Salix sericea	silky willow		x	x			x	x	x			x	x			x		
Sambucus canadensis	common elderberry	x	x	x			x	x	x				x			x	x	
Spiraea alba	narrow-leaved	x	x	x			x						x			x		

Native Shrubs																	
Scientific Name	**Common Name**	**Uses**					**Region**				**Light**				**Moisture**		
		W	**H**	**C**	**D**		**M**	**P**	**C**		**S**	**P**	**F**		**L**	**M**	**H**
	meadowsweet																
Spiraea latifolia	broad-leaved meadowsweet	x	x	x			x						x			x	
*Stewartia malacodendron**	silky camelia		x						x		x	x				x	
Vaccinium angustifolium	Northern lowbush blueberry	x	x	x			x						x		x		
Vaccinium corymbosum (*V. virgata, formosa*)	highbush blueberry	x	x	x			x	x	x		x	x	x		x	x	x
Viburnum dentatum	Southern arrow-wood viburnum	x	x	x			x	x	x			x	x		x	x	
Viburnum nudum	possum-haw viburnum		x	x			x	x	x		x	x					x
Viburnum prunifolium	black-haw viburnum	x	x	x			x	x	x			x	x			x	
+ May be aggressive in garden setting.																	
* Due to the rarity and sensitivity of habitat in Virginia, these species are recommended for horticultural use only. Planting these species in natural areas could be detrimental to the survival of native populations																	

TABLE 11 NATIVE TREES

Recommended Uses	Native Regions	Minimum Light Requirements	Minimum Moisture Requirements
W = Wildlife	M = Mountains	S = Full Shade	L = Low Moisture
H = Horticulture and Landscaping	P = Piedmont	P = Partial Sun	M = Moderate Moisture
C = Conservation and Restoration	C = Coastal Plain	F = Full Sun	H = High Moisture
D = Domestic Livestock Forage			

Native Trees																	
Scientific Name	**Common Name**	**Uses**					**Region**				**Light**				**Moisture**		
		W	**H**	**C**	**D**		**M**	**P**	**C**		**S**	**P**	**F**		**L**	**M**	**H**
Small trees																	
Amelanchier arborea	Downy serviceberry	x	x	x			x	x	x			x	x			x	
Amelanchier canadensis	Canada serviceberry	x	x	x			x	x	x				x			x	x
Amelanchier laevis	Smooth serviceberry	x	x	x			x					x	x		x	x	
Asimina triloba	Paw paw	x	x	x			x	x	x		x	x				x	
Cercis canadensis	redbud (Eastern)		x	x			x	x	x		x	x				x	
Chionanthus virginicus	fringetree		x				x	x	x			x	x			x	
Cornus alternifolia	alternate-leaf dogwood	x	x	x			x	x			x	x			x	x	
Cornus amomum	silky dogwood	x		x			x	x	x		x	x				x	x
Cornus florida	flowering dogwood	x	x	x			x	x	x		x	x			x	x	
Crateagus crus-galli	cockspur hawthorne	x	x	x			x	x	x			x	x		x	x	
Crateagus flava	October haw	x	x				x	x	x			x	x			x	
Euonymous atropurpureus	wahoo		x	x			x	x	x		x	x				x	
Halesia tetraptera (*H. carolina*)	common silverbell		x				x					x	x			x	
Ilex opaca	American holly	x	x	x			x	x	x		x					x	
Magnolia virginiana	sweetbay magnolia		x	x				x	x		x	x				x	x
Morus rubra	red mulberry	x	x	x			x	x	x		x	x				x	
Ostrya virginiana	Eastern hop-hornbeam		x				x	x	x		x	x				x	
Persea borbonia	redbay, sweet bay		x	x					x		x	x				x	X
Prunus americana	American wild plum		x	x			x	x	x			x				x	
Prunus virginiana	choke cherry	x	x	x			x					x				x	
Rhus glabra	smooth sumac	x	x	x			x	x	x				x		x	x	

Native Trees																		
Scientific Name	**Common Name**	**Uses**					**Region**				**Light**				**Moisture**			
		W	**H**	**C**	**D**		**M**	**P**	**C**		**S**	**P**	**F**		**L**	**M**	**H**	
Rhus hirta (*R. typhina*)	staghorn sumac	x	x	x			x	x	x				x		x			
Salix nigra	black willow			x			x	x	x			x	x			x	x	
Medium to Large Trees																		
Acer rubrum	red maple		x	x			x	x	x				x			x	x	
Acer saccharum	sugar maple		x	x			x	x				x	x			x		
Aesculus flava (*A. octandra*)	yellow buckeye		x				x	x				x				x		
Betula alleghaniensis	yellow birch	x	x	x			x					x	x			x		
Betula lenta	sweet birch, black birch	x	x	x			x	x				x	x			x		
Betula nigra	river birch	x	x	x			x	x	x				x			x	x	
Carya alba (*C. tomentosa*)	mockernut hickory			x			x	x	x		x	x			x	x		
Carya glabra	pignut hickory	x	x	x			x	x	x		x	x			x			
Carya ovata	shagbark hickory			x			x	x	x			x	x			x		
*Chamaecyparis thyoides**	Atlantic white cedar	x	x						x		x	x				x	x	
Diospyros virginiana	Persimmon	x	x	x			x	x	x		x	x	x		x	x		
Fagus grandifolia	American beech	x	x				x	x	x		x	x	x			x		
Fraxinus americana	white ash	x	x				x	x	x			x	x			x		
Fraxinus pensylvanica	green ash	x	x	x			x	x	x			x	x			x		
Juglans nigra	black walnut	x		x			x	x	x			x	x			x		
Juniperus virginiana	red cedar (Eastern)	x	x				x	x	x			x	x		x	x		
Liquidambar styraciflua	sweetgum		x	x			x	x	x		x	x	x			x	x	
Liriodendron tulipifera	tulip-tree, tulip poplar	x	x	x			x	x	x				x			x		
Magnolia	cucumber		x				x						x			x		

Native Trees																		
Scientific Name	**Common Name**	**Uses**					**Region**				**Light**				**Moisture**		
		W	**H**	**C**	**D**		**M**	**P**	**C**		**S**	**P**	**F**		**L**	**M**	**H**
acuminata	magnolia																
Nyssa aquatica	water tupelo	x	x	x					x			x	x				x
Nyssa sylvatica	black gum	x	x	x			x	x	x			x	x			x	
Oxydendrum arboreum	sourwood		x				x	x	x			x				x	
Pinus echinata	shortleaf pine		x				x	x	x			x	x		x		
Pinus serotina	pond pine	x	x	x					x				x			x	x
Pinus strobus	white pine		x	x			x	x	x				x		x	x	
Pinus taeda	loblolly pine	x	x	x				x	x				x		x		x
Pinus virginiana	Virginia pine			x			x	x	x				x		x		
Platanus occidentalis	sycamore			x			x	x	x			x	x			x	x
Prunus pennsylvanica	pin cherry, fire cherry	x		x			x					x	x		x		
Prunus serotina	wild black cherry	x		x			x	x	x			x	x		x		
Quercus alba	white oak	x	x	x			x	x	x			x	x		x		
Quercus bicolor	swamp white oak	x		x			x	x	x		x	x					x
Quercus coccinea	scarlet oak	x	x				x	x	x			x	x		x		
Quercus falcata	Southern red oak	x	x	x			x	x	x		x	x			x	x	
Quercus ilicifolia	bear oak	x		x			x	x					x		x		
Quercus laurifolia	swamp laurel oak	x		x					x			x	x			x	x
Quercus michauxii	swamp chestnut oak	x	x					x	x			x	x				x
Quercus montana (*Q. prinus*)	chestnut oak	x		x			x	x	x		x	x			x		
Quercus nigra	water oak	x		x					x		x	x			x	x	
Quercus palustris	pin oak	x	x	x			x	x	x		x	x				x	x
Quercus phellos	willow oak	x	x	x				x	x			x	x			x	x
Quercus rubra	Northern red oak	x	x	x			x	x	x			x	x		x	x	
Quercus stellata	post oak	x	x	x			x	x	x				x		x		
Quercus velutina	black oak	x		x			x	x	x		x	x			x		
Robinia pseudoacacia	black locust			x			x	x	x			x	x			x	
Sassafras albidum	sassafras			x			x	x	x			x	x		x	x	

Native Trees																		
Scientific Name	**Common Name**	**Uses**					**Region**				**Light**				**Moisture**			
		W	**H**	**C**	**D**		**M**	**P**	**C**		**S**	**P**	**F**		**L**	**M**	**H**	
Taxodium distichum	bald cypress		x	x					x				x				x	
Thuja occidentalis	white cedar	x	x	x			x						x			x	x	
Tilia americana	American basswood			x			x	x	x			x				x		
Tsuga canadensis	Eastern hemlock	x	x	x			x	x				x	x			x		
Tsuga caroliniana	Carolina hemlock	x	x	x			x					x	x		x	x		
+ May be aggressive in garden setting.																		
* Due to the rarity and sensitivity of habitat in Virginia, these species are recommended for horticultural use only. Planting these species in natural areas could be detrimental to the survival of native populations.																		

~~7.500 WETLANDS~~

7.500 RPA DELINEATION AND WETLAND REQUIREMENTS

A. Pursuant to Chapter 1222, an RPA delineation shall be provided in conjunction with the submission of each plan of development application proposing land disturbance in excess of two thousand five hundred (2,500) square feet, except that no such delineation shall be required where one has previously been approved. A digital file prepared according to Building and Development Digital File Submission Standards containing the approved RPA delineation shall be submitted with each plan of development requiring the submission of an RPA delineation. The purpose of an RPA delineation is to determine whether water bodies on or within the parcel have perennial flow, to identify the presence of wetlands connected by surface flow and contiguous to a water body with perennial flow, and to delineate the Buffer Area boundary consistent with the requirements of Chapter 1222. The RPA delineation shall be certified by a professional engineer, land surveyor, landscape architect, soil scientist, or wetland delineator certified or licensed to practice in the Commonwealth of Virginia and shall contain the following information:

1. A Perennial Flow Determination. A reliable, site-specific evaluation shall be conducted to determine whether water bodies within the development site have perennial flow.

a. Such determination shall be performed using a method determined by the Virginia Department of Conservation and Recreation, Division of

Chesapeake Bay Local Assistance to be scientifically valid and that is acceptable to the Director.

b. If water bodies on the development site have a drainage area less than fifty (50) acres, a modified perennial flow determination with less detail, acceptable to the Director, may be submitted. The modified perennial flow determination shall specify the drainage area of each stream and shall include a narrative documenting observed flow conditions accompanied by dated photos and other relevant observations. The Director may accept the findings of the modified perennial flow determination or may require a perennial flow determination to be conducted consistent with the requirements of this Section.

2. A Wetland Delineation. A Jurisdictional Determination approved by the Army Corps of Engineers ("Corps") confirming the locations of jurisdictional waters and wetlands within the development site.

3. A Buffer Area Boundary Delineation. The Buffer Area boundary delineation shall include the 100-foot Buffer Area located adjacent to and landward of water bodies with perennial flow and wetlands connected by surface flow and contiguous to a water body with perennial flow.

4. The RPA delineation shall be depicted on each plan of development. The RPA delineation shall be depicted with bearings and distances on plats as defined in Chapter 8.

~~A.~~B. Wetland data for areas outside the RPA must be provided as specified below:

1. Preliminary Plats:

a. Potential jurisdictional waters and wetlands as identified by (i) the Loudoun County Predictive Wetlands Model or (ii) a consultant delineation performed in accordance ~~with Army Corps of Engineers ("~~Corps~~")~~ standards shall be depicted on the Preliminary Plat with a note indicating that the wetland information is preliminary and subject to change pending verification by the Corps; or

b. In the event that a Jurisdictional Determination confirming the locations of jurisdictional waters and wetlands has been approved by the Corps, such Jurisdictional Determination shall instead be depicted on the Preliminary Plat with a note referencing the source of the wetland information (including the Corps Jurisdictional Determination number and date).

c. In either event, the Plat shall also include a note stating that all applicable state and federal permits shall be obtained prior to disturbances within jurisdictional waters and wetlands.

2. Construction Plans and Profiles and Site Plans:

a. First Submission

i. Potential jurisdictional waters and wetlands as identified by a consultant delineation performed in accordance with Corps standards shall be depicted on the plan with a note indicating that the wetland information is preliminary and subject to change pending verification by the Corps; or

ii. A Jurisdictional Determination confirming the locations of jurisdictional waters and wetlands approved by the Corps shall be depicted on the plan with a note referencing the source of the wetland information (including the Corps Jurisdictional Determination number and date).

b. Prior To Plan Approval - A Jurisdictional Determination confirming the locations of jurisdictional waters and wetlands approved by the Corps shall be depicted on the Plan with a note referencing the source of the wetland information (including the Corps Jurisdictional Determination number and date). The Plan shall also include a note stating that all applicable state and federal permits shall be obtained prior to disturbances within jurisdictional waters and wetlands.

3. Grading Permits:

a. A Jurisdictional Determination confirming the locations of jurisdictional waters and wetlands approved by the Corps shall be depicted on the Erosion and Sediment Control Plan submitted with the Grading Permit application with a note referencing the source of the wetland information (including the Corps Jurisdictional Determination number and date). The Plan shall also include a note stating that all applicable state and federal permits shall be obtained prior to disturbances within jurisdictional waters and wetlands.

b. Copies of all State and Federal wetland permits and copies of the approved impact maps shall be submitted with the Grading Permit application.

c. A digital file prepared according to Building & Development Digital File Submission Standards containing the location of jurisdictional waters and wetlands on the property as verified by the Jurisdictional Determination issued by the Army Corps of Engineers and the location of all permitted impacts shall be submitted with the Grading Permit application.

B. Stream and Wetland Mitigation
On-site mitigation designs are reviewed in conjunction with the Construction Plan and Profiles or Site Plan and Grading Permit as submitted for the related land development project or section thereof. Stream and Wetland Mitigation Banks and off-site mitigation projects are reviewed as a Grading Permit Application.

7.501 Water Quality Impact Assessment Requirements

A. A Water Quality Impact Assessment (WQIA) shall be required for any proposed land disturbance, development, or redevelopment within an RPA, excluding agriculture (except structures) and uses that are exempt pursuant to Chapter 1222. A WQIA shall be submitted for the permitted uses outlined in Chapter 1222 concurrent with construction plans and profiles, site plans, and erosion and sediment control plans. A WQIA shall also be submitted in conjunction with all waiver and exception requests as outlined in Chapter 1222. The purpose of the WQIA is to identify the impacts of proposed land disturbance, development, or redevelopment on water quality and land within the RPA and to identify specific mitigation measures for those impacts. There shall be two types of water quality impact assessments:

1. A Minor WQIA shall be required for any proposed land disturbance, development, or redevelopment, or waiver or exception request, of 2,500 square feet or less of land disturbance within the RPA and that does not encroach into the seaward fifty (50) feet of the Buffer Area. The Minor WQIA shall demonstrate that the combination of undisturbed RPA buffer area, restoration plantings, proposed Best Management Practices (BMPs), and other proposed mitigation measures will be effective in retarding runoff, preventing erosion, and filtering nonpoint source pollution from runoff. The Minor WQIA shall include the following information:

a. A site drawing, to scale if practicable, that depicts the following:

i. The boundaries of the RPA as identified by an RPA delineation performed in accordance with the requirements of the Facilities Standards Manual;

(a) Where the Minor WQIA is associated with an administrative waiver or an exception not associated with a

plan of development for a disturbance within the RPA of less than 2,500 square feet, the applicant may request that the County perform the RPA delineation.

ii. The location of the proposed encroachments into the RPA; and

iii. The proposed limits of clearing and grading;

b. Location and description of existing vegetation on site, including the number and type of trees six (6) inches or greater in diameter at breast height (4.5 feet) to be removed in the RPA as a result of the proposed encroachment;

c. A description of the proposed erosion and sediment controls;

d. A description of and justification for the proposed encroachment;

e. A description of the proposed mitigation, including the type and location of any proposed plantings and BMP facilities; and

f. Any other information deemed necessary by the Director to evaluate potential water quality impacts associated with the proposed encroachment.

2. A Major WQIA shall be required for any proposed land disturbance, development or redevelopment, or waiver or exception request, that exceeds 2,500 square feet of land disturbance within the RPA or encroaches into the seaward fifty (50) feet of the Buffer Area. The Major WQIA shall be certified by a professional engineer or land surveyor licensed to practice in the Commonwealth of Virginia, shall demonstrate that the proposed mitigation will be effective in retarding runoff, preventing erosion, and filtering nonpoint source pollution from runoff, and shall include the following information:

a. A plat prepared at a scale of one inch equals fifty feet (1"=50') that depicts the boundaries of the RPA as identified by an RPA delineation performed in accordance with the requirements of the Facilities Standards Manual, the location of the proposed encroachment into the RPA including the proposed limits of clearing and grading, the area of proposed grading, the location and area of all proposed impervious surfaces, and all the location of all proposed structures, roads and driveways, drainfields, wells, conveyance lines, storm sewers, stormwater management facilities, and other improvements;

b. A Tree Cover Inventory, prepared under the direction of and signed by an ISA Certified Arborist or a professional forester who has at least a Bachelor of Science degree from an accredited School of Forestry, that shall include a delineation and full stand description (species composition, stand structure, dominant size class, age, regeneration, quality, and history) of all tree cover types present within the RPA, and shall identify all trees thirty (30) inches or greater in diameter at breast height (4.5 feet) within the RPA, by genus, species and common name, diameter breast height, and a condition rating.;

c. A description of the existing topography, hydrology, soil characteristics, and erosion potential of the site;

d. A discussion of proposed changes to the site topography and hydrology, including a description of the extent and nature of any proposed disturbance to jurisdictional waters or wetlands and the potential water quality impacts of the proposed encroachment;

e. Where applicable, an estimation of the pre-development and post-development pollutant loads;

f. A description of and justification for the proposed encroachment;

g. A description of the proposed mitigation, including the type and location of any proposed plantings and BMP facilities;

h. A construction schedule, including the anticipated duration of construction; and

i. Any other information deemed necessary by the Director to evaluate potential water quality impacts associated with the proposed encroachment.

7.600 EROSION AND SEDIMENT CONTROL

A. The Virginia Erosion and Sediment Control Handbook and the Loudoun County Codified Ordinances shall be the accepted references in the preparation of grading plans and erosion and sediment control proposals.

The following measures currently specified as acceptable by the Handbook are, in fact, prohibited within Loudoun County without the specific authorization from the Director of Building and Development**:**

1. Straw bale barriers

2. Brush barriers

B. The use of diversion berms to break up drainage divides to support the use of sediment traps shall only be allowed where it can be demonstrated that maintenance of the berm can be accomplished during site grading activities.

C. The erosion and sediment control plan shall provide for two-phase erosion and sediment measures.

1. The First Phase shall reflect the perimeter controls and any interior controls necessary to protect undisturbed land areas and shall reflect existing conditions including drainage divides. Existing drainage divides shall be the basis to determine the use of sediment traps versus sediment basins.

2. The Second Phase shall reflect specific controls once the infrastructure and storm sewer pipes are installed. Future drainage divides shall be considered when designing this phase.

D. See FSM Section 8.111 for Grading Permit application requirements.

E. The erosion and sediment control plan shall provide a detailed narrative to include the following:

1. Project Description

2. Existing Site Conditions

3. Adjacent Property Information (Including adequate outfall analysis, if applicable.

4. Off-Site Areas (i.e. Stockpile Areas, Site Access)

5. Soil Information

6. Critical Erosion Areas

7. Explanation of the designed erosion and sediment control measures.

8. Sequence of construction plan/schedule and, if applicable, the phasing of proposed clearing and construction activities.

F. Super silt fence is a temporary barrier of Geotextile Class F over 2-inch wire fabric mesh (chain link) used to control sediment-laden runoff from small drainage areas where the use of typical silt fence is questionable due to slope, proximity to a stream or other site conditions. Super silt fence should be used where the installation of a dike would destroy sensitive areas such as woods and wetlands.

1. Super silt fence should be placed as close to the contour as possible. No section of silt fence should exceed a grade of 5 percent for more than 50 feet.

2. Super silt fence is not intended to replace primary controls such as sediment traps or sediment basins.

3. Length of the flow contributing to the super silt fence installation site shall conform to the following limitations:

SLOPE	SLOPE STEEPNESS	SLOPE LENGTH (MAX.)	SILT FENCE LENGTH (MAX.)
0-10%	0-10:1	Unlimited	Unlimited
10-20%	10:1-5:1	200 feet	1,500 feet
20-33%	5:1-3:1	100 feet	1,000 feet
33-50%	3:1-2:1	100 feet	500 feet
50% Plus	2:1 Plus	50 feet	250 feet

4. Construction Specifications

a. Fencing shall be 42 inches in height and constructed in accordance with the latest Virginia Department of Transportation Road and Bridge Standards for chain link fencing.

b. Chain link fence shall be securely fastened to the fence posts with wire ties or other suitable means. The lower tension wire, brace and truss rods, drive anchors and post caps are not required except on the ends of the fence.

c. The silt fence fabric shall be securely fastened to the chain link fence with ties spaced every 24 inches at the top and mid-section.

d. The silt fence fabric shall be embedded a minimum of 8 inches into the ground.

e. When two sections of silt fence fabric adjoin each other, they shall be overlapped by 6 inches and folded.

f. Maintenance shall be performed as needed and silt build-up removed when the silt reaches one-half the height of the fence.

g. The silt fence fabric shall meet the following requirements for Geotextile, Class F:

Tensile Strength	50 lb/in (Min)	ASTM Test Method D-4595
Tensile Modulus	20 lb/in (Min)	ASTM Test Method D-4595
Flow Rate	0.3 gal/cu.ft/min. (Max)	ASTM Test Method D-5141
Filtering Efficiency	75 Percent (Min)	ASTM Test Method D-5141

G. Development of Parks, Recreation and Community Services Facilities

Grading and construction of any facilities for the Loudoun County Department of Parks, Recreation and Community Services (PRCS), such as ballfields, trails and open space areas, shall comply with the PRCS Construction & Design Guidelines in effect at the time construction commences.

7.700 UTILITY PLACEMENT

Underground installation of utilities, such as electric, telephone and cable television, shall be installed for new subdivision and site plan developments and to the extent possible in re-development projects. Such utilities shall be placed under the sidewalks or within the right-of-way when feasible.

7.800 ENVIRONMENTAL AND CULTURAL RESOURCE EXISTING CONDITIONS PLAT

An Environmental and Cultural Resource Existing Conditions Plat ("Existing Conditions Plat") is required for the optional pre-submission meetings as set forth in Chapter 8 of this manual. A preliminary sketch plan and narrative to provide an overview of the proposed development layout and plan shall accompany this Existing Conditions Plat. Both the preliminary sketch plan and Existing Conditions Plat shall be drawn at the same scale, preferably 1" equals 200'.

The purpose of this Existing Conditions Plat is to determine the limits of environmentally sensitive and cultural resource areas within any property(ies) prior to development of the property to promote conservation of the resources and the incorporation of the features into the development design. The Existing Conditions Plat shall be prepared using literature, data or

County generated maps to illustrate the existing environmental and cultural resources identified herein. This requirement does not release the applicant from obtaining permits from the Army Corps of Engineers and the Virginia Department of Environmental Quality for disturbances in wetland areas.

The Existing Conditions Plat shall identify and illustrate the location of environmental and cultural resources on the property and off-site 100 feet beyond the subject property boundary and shall be accompanied by a brief narrative description of the identified resources and the source of the information for each identified resource. The following are examples of such resources:

A. A letter from the Virginia Department of Conservation and Recreation, Division of Natural Heritage identifying occurrences of natural heritage resources on the property such as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

B. Areas of forest or other vegetated cover as depicted in the Loudoun County Geographical Information System (LOGIS).

C. Floodplains, as depicted in LOGIS, or an approved floodplain study.

D. Archaeological sites and structures, cemeteries, and historic landmarks as identified and specifically numbered in a letter from the Virginia Department of Historic Resources.

E. Very Steep and Moderately Steep Slopes, as identified in LOGIS.

F. Known pollution sources (including without limitation dump sites, drainfields, buried fuel tanks, hazardous material storage facilities, solid and liquid disposal sites, etc.), wells and springs as identified in LOGIS.

G. Topography using 5 foot or lower contours, structures, foundations, and features such as sink holes, karst features, drainage channels, and waterbodies as identified in LOGIS.

H. Soils and geologic information as identified in LOGIS.

I. Open space and conservation easements.

J. Overlay Districts, as established in the Zoning Ordinance.

K. The boundaries of the Scenic Creek Valley Buffer and any other required environmental buffers.

L. Potential jurisdictional waters and wetlands as identified by (i) the Loudoun County Predictive Wetlands Model, or (ii) a consultant delineation performed in accordance with

Army Corps of Engineers (Corps) standards, or (iii) a Corps-approved wetland delineation.

M. The boundaries of the Resource Protection Area as depicted on the adopted Chesapeake Bay Preservation Area Map or per an approved RPA delineation.

7.810 PHASE IA RECONNAISSANCE-LEVEL ARCHAEOLOGICAL SURVEY

The purpose of the Phase IA Reconnaissance-Level Archaeological Survey (the "Phase IA") is to identify areas of the property subject to the application where there is a high probability of the existence of archaeological resources and to make recommendations as to whether further archaeological investigation (Phase I survey) is warranted.

A. The Phase IA shall be conducted by a qualified professional meeting the Qualification Standards as set forth in the U.S. Secretary of the Interior Standards and Guidelines for Archaeology and Historic preservation.

B. The Phase IA report shall include the following information:

1. Physical description of project area.

2. Research design and methods.

3. Cultural context: A generalized prehistoric and historic context for the project area.

4. Map of project area which identifies and locates previously recorded archaeological and historic sites on-site and within a one-mile radius of the project area, historic extant structures and approximate locations of non-extant structures in accordance with historic maps and pedestrian survey, existing conditions and high probability areas within the project.

5. Project results.

6. Recommendations regarding further investigation.

C. Archival data resources should include the Department of Historic Resource's (DHR) inventory of previously recorded archaeological sites and standing structures with associated reports, the Virginia State Library holdings related to Loudoun County, historic County maps, and land grant information held by the Thomas Balch Library.

D. Current predictive models developed for diverse site-types by professional archaeologists in conjunction with information gathered from archival research should be employed to identify areas of high probability for archaeological resources within a project area.

E. A pedestrian survey for visual inspection shall be conducted upon the property that is the subject of the application. Any above-ground features identified as part of the survey should be mapped and photographed. Original photographs or digital reproductions should be included in the report.

7.900 REFERENCES FOR CHAPTER 7

Codified Ordinances of Loudoun County of Virginia.

"Guide Policy for Roadway Lighting Facilities and Security Lighting Facilities" (VDOT).

Virginia Erosion and Sediment Control Handbook, Division of Soil and Water Conservation.

AASHTO Handbook.